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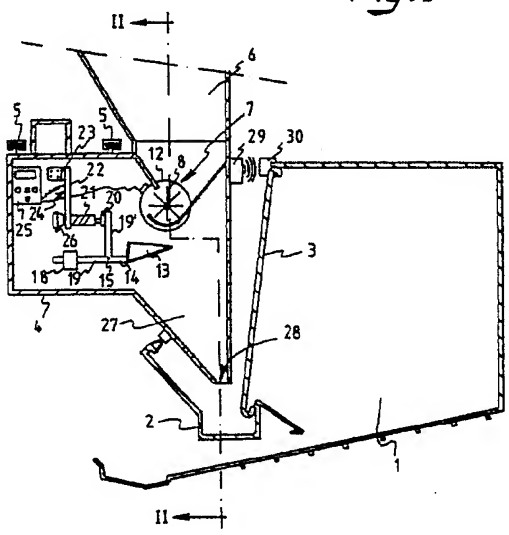
(54) Device and method for supplying, very accurately metered, a quantity of food to small livestock.

(57) The invention relates to a method and a device for very accurately metering a quantity by weight of food for being supplied to small livestock, such as poultry, which small livestock is present in a number of cages (1) placed one behind the other. The outflow of food from a food hopper (6) filled with food, can be stop the moment when is determined that the receiving trough (13) contains a sufficient quantity of food.

This quantity of food corresponds to a certain desired quantity of food per animal multiplied by the number of animals to be fed. After the receiving trough (13) has been filled it is emptied for example into a feed trough (2). The preference the device is provided with a sensor (29) or the like which can scan an indicator (30) which can be fastened to a cage (1), which indicator (30) emits a signal indicating the number of animals present in that cage (1).

Fig:1



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Device and method for supplying, very accurately metered, a quantity of food to small livestock.

The invention relates to a method and a device for the very accurate metering of a certain quantity by weight of food, which quantity of food is to be supplied at known times to a number of small livestock, the quantity by weight of food being determined beforehand from the number of small livestock to be fed.

The installations used for the regular supply of animals with food on farms keeping large numbers of small livestock are generally known. In this connection, rearing farms and laying batteries for hens are well known. On farms of this type the small livestock is mostly kept in cages, a limited number of animals being kept in each cage. Farms of this type must operate as economically as possible in order to achieve a good competitive position, and for this reason the quantity of food each animal must receive each time and the frequency at which it must receive the food in a space of 24 hours are determined beforehand in order that the efficiency is as high as possible. On rearing farms and laying batteries hens are mostly kept in a large number of cages arranged in rows one behind the other and each cage containing the same number of, for example six, birds. This number may vary from cage to cage in the long term as a result of, for example, the death of an animal. In order to provide all the animals with the correct quantity of food at the correct point in time feed trough are placed in front of the cages.

In general, two systems are used in order to provide all the animals with the required quantity of food as quickly as possible and with the least possible manpower. One system comprises a chain system in which the food is passed through the feed trough by means of a type of chain, the links carrying the food along. The food flows from a silo onto the chain and all the food will thus be distri buted at the same time over the cages. This system has the drawback that the food does not reach all the hens in the same quantity at the same time. The hens accommodated in the last cages will be able to pick from the food much later than the hens housed directly in the vicinity of the silo, i.e. at the point which the food passes first. Moreover, no account is taken of whether there is a large number or smaller number of hens per food trough. There are therefore always a number of hens which receive comparatively too little food. In order to prevent this an excess of food is distributed along the feed trough so that even the last hens may receive sufficient food. However, as a result of this a number of hens receive an excessive quantity of food resulting in lower efficiency.

Another known system comprises a food-distributing carrier which moves along the feed trough and which pours out a specific quantity of food for each cage. In this system, the outflow orifice is adjusted so that approximately the required quantity of food falls into the food trough at each cage when the food-distributing carrier is moved along the cages. The food-distributing carrier consist of a supply trough having an outflow orifice at the underside, which is also called a hopper. The outflow orifice cannot, however, be adjusted accurately enough for the food to fall out in the required quantity at every point. Moreover, when all the cages are provided with food and the hopper still contains food, so that the hens have not received the calculated quantity of food, this quantity of remaining food will still have to be supplied to the hens in an additional round. Another is that each cage will receive the same quantity of food in the food trough whereas there may be a smaller number of animals housed in the cage. These hens as a result receive too much food in comparison.

The object of the invention is a method and a device with which it is possible to pour out, very accurately, the required quantity of food, determined beforehand, fore each cage, the possibilities including, at the same time, that the number of animals contained in each cage is taken into account.

This object is achieved by a method according to the invention, in that food flows out, using first means, of a storage silo or food hopper filled with food at a rate more or less determined beforehand, in that the outflowing food is received in a trough, in that the point in time when the receiving trough contains a certain, required quantity of food is determined with second means, in that, as soon as the receiving trough contains the required quantity of food, the flow of food is stopped, in that thereafter the receiving trough is emptied, by third means, at, for example, a certain required time or place and in that the first means are then reactivated as a result of which the flow of food again flows out of the food hopper and the cycle is repeated. With a method of this type the required quantity of food can quickly be determined very accurately at any time and poured into the feed trough for the small livestock. As a result it is possible to supply each cage each time very precisely with the required quantity of food. A method of this type can be carried out with a device according to the invention, in that the device comprises a frame to which is fastened a storage silo or food hopper, first means capable of flowing a flow of food out of the hopper, the device being provided with a receving trough in which the out-

flowing food can be received, in that the device comprises second means with which the point in time at which the receiving trough contains a certain required quantity of food is determined, in that the weighing means can emit a signal which stops the flow of food flowing out of the hopper, and in that the receiving trough can be emptied, for example tilted, by third means, and in that the said device can be moved along the cages.

In a preferred embodiment of the device according to the invention the device is provided with a sensor with which an indicator can be read off, this indicator showing the number of food units to be poured out for a specific cage and the cage may be provided for this purpose with the above indicator. By providing each cage an adjustable indicator it is always possible during the movement of the device along the cages to adjust the required quantity of food to be placed in the feed trough of a specific cage. It is possible as a result to provide each cage with a quantity of food which corresponds precisely with the quantity required for each animal so that the operation is optimally economical.

The invention will be illustrated in detail by reference to the drawing, in which:

Figure 1 shows a cross-section through a cage of a laying battery with a feeding device according to the invention, also in a cross-section;

Figure 2 shows a cross-section of the feeding device according to the invention along the line II-II in figure 1;

Figure 3 shows cages.

In Figure 1, a cage 1 of a laying battery is shown in cross-section, having a feed trough 2. Each cage is provided at the front side with a cage door 3. The device for feeding the small livestock is shown in front of the cage door. This device consists of a house or frame 4 which can be moved along a rail 5. At the top of the house 4 a storage silo 6 is attached and this provided at the underside with an outflow orifice 7. A storage silo 6 of this type is also called a food hopper. Downstream from the outflow orifice the hopper 6 has the shape of a funnel and a food-distributing roll 8 is placed in the slit-shaped outflow orifice 7. This food-distributinig roll 8 comprises a bar over the entire length of the outflow orifice and rotatably mounted near the extremities 9, 10. The bar or metering roll 8 is provided with small projections 11 which can always carry along small quantities of food when the roll 8 is turned round. The roll 8 can be turned round by means of an electric motor 12. By interrupting the current supply of the motor 12 the motor can be stopped and the flow of food thus stopped. A receiving trough 13 fastened to a shaft by means of two arms 14 is arranged under the place where the food falls downwards out of the hopper 6. The shaft 15 is rotatably fastened in the house 4 at points 16, 17. Two counterweights 18 are fastened to one arm 19 and are used to rotate the small trough 13 upwards about the shaft 15 if the small receiving trough is empty. The counterweights are chosen such that, above a certain weight, the small trough has a larger moment relative to the shaft than the counterweights, this certain weight being set at a value of a quantity of food in the small trough corresponding to, for example, the quantity of food to be fed to two animals.

An arm 19, to which a small iron plate 20 capable of interacting with an electromagnet 21 is attached, is fastened to the member comprising the receiving trough 13, the shaft 15 and counterweights 18 with the various arms. The said elecrtomagnet 21 is fastened near the extremity of a bar 22 the other extremity 23 of which is permanently fastened to the house or frame 4. A strain gauge 24 is fastened onto the bar 23. The signal emitted by the strain gauge is pased to a microprocessor 25 which compares the signal with a set signal. As soon the set signal and the emitted signal from the strain gauge cerrespond to each other the supply of current to the motor 12 is interrupted as a result which the food-distributing roll 8 will stop.

To prevent the bar 22 with the strain gauge 24 from sagging too far when the receiving trough 13 rotates back into the rest position a stop 26 attached to the house, on the other side of the bar 22 at the position where the electromagnet 21 is attached. When the receiving trough 13 is filled with the quantity of food and the signal derived from the strain gauge 24 has stopped the food flow by means of the microprocessor 25 the small receiving trough 13 will still always be in the uppermost position because the member is held in this position by means of the electromagnet 21. As soon as the electromagnet is no longer energized the small receiving trough 13 will rotate about the shaft 15 as a result of the weight of the food present in the small receiving trough 13, and the food will be poured out into a funnel 27 opening into a slit 28. The width of the receiving trough 13 and hence of the slit 28 preferably corresponds to the width of a cage 1. As soon as the device is in the correct position above the feed trough 2 the food will be poured out. Near the top of the device on the house 4 a sensor 29 is attached which is capable of interacting with an indicator 30 which indicator 30 emits a signal indicating the number of animals present in the next cage. Thereafter, the sensor 29 will emit a signal to the microprocessor 25 as a result of which the latter will adjust itself so that the correct weight of food will be poured out into the receiving trough 13.

The microprocessor 25 can be set beforehand

to the desired quantity of food which each is to receive each time. This is often dependent on the position of the cages. Birds near the outer side of the sheds containing the cages are usually in cooler air than birds present in the middle of the battery. In general, animals at cooler places must receive more food than animals at warmer places. This can be taken into account by means of the microprocessor. The microprocessor can be set beforehand to the quantity of food to be distributed to each animal in each row of cages. A signal can then be emitted by the sensor 29 to the sensor which signal indicates the number of animals in the next-following cage; the microprocessor can consequently determine which signal belongs to the total weight to be compared with the signal derived from the strain gauge. The receiving trough is thereafter filled with food until it contains the desired quantity of food. The microprocessor is to be calibrated beforehand in connection with the strain gauge.

Figure 3 shows part of a laying battery with a number of cages 31, 32, 33, 34, each cage containing a different number of hens. If cage 31 contains, for example, 6 hens, cage 32: 5 hens end cage 33: 4 hens, then the quantities of food to be deposited in the feed trough 2 for each cage must also relate to each other as 6 : 5 : 4. The ratio to be fed to the microprocessor can then be given by the indicator 30 attached to the outer side of each cage. These are to be adjusted if the number of hens in a cage changes. The correct moment at which the receiving trough is to be emptied can be determined by means of a microswitch 35 which fastened to the outer side of the cage and can be operated by a projection, in this case the indicators 29. The current supply to the electromagnet can be interrupted by the microswitch. By correctly positioning the microswitch it is also possible to set the correct moment for emptying the receiving trough.

Claims

1. Method for very accurately metering a quantity by weight of food intended for being supplied, at fixed times, to small livestock, such as poultry, which small livestock is present, in a number of cages placed one behind the other, characterized in that food flows out using first means (8), of a storage silo or food hopper (6) filled with food, in that the outflowing food is received in a receiving trough (13), in that the outflow of food is stopped the moment when is determined with second means (22, 24), that the receiving trough (13) contains a quantity of food which quantity of food corresponds to a certain desired quantity of food per animal multiplied by the number of animals to be fed, for example, per cage (1), in that thereafter the receiving trough (13) is emptied for example into a feed trough (2), by third means (19', 20, 21), at a certain time or place and in that thereafter the first means (8) are reactivated as a result of which a constant flow of food again flows out of the foodhopper (6) and the cycle is repeated.

2. Method according to claim 1, characterized in that, the first means (8) consist of a food-distributing roll (8), the second means consist of a strain gauge (24) fastened to an arm (22) connected to the receiving trough (13) and the third means of an electromagnet (21) and an iron plate (20) attached to an arm (19') and capable to interact to each other.

3. Method according to one of the claims 1 or 2, characterized in that before the first means (8) are activated by a sensor, pick-up or the like, an indicator is scanned which indicator indicates the number of animals present in the next-following cage (1), which indicator is, for example, fastened in front of or near the cage (1) which is the next to receive a supply of food.

4. Device movable along a number of cages (1) with animals by the use of moving means, characterized in that the device comprises a frame, a storage silo or food hopper (6), first means (8) capable of flowing a flow of food out of the hopper, a member with a receiving trough (13), in which receiving trough (13) the outflowing food can be received, second means with which the point in time at which the receiving trough (13) contains a certain required quantity of food can be determined, the weighting means being capable of emitting a signal as soon as the desired quantity of food is present in the receiving trough (13), and by means of this signal the food flow can be stopped and in that third means are present with which the receiving trough (13) van be positioned so that the quantity of food flows out of the receiving trough (13).

5. Device according to claim 4, characterized in that, the first means (8) consist of a food-distributing roll (8), the second means consist of a strain gauge (24) fastened to an arm (22) connected to the receiving trough (13) and the third means of an electromagnet (21) and an iron plate (20) attached to an arm (19') and capable to interact to each other.

6. Device according to claim 4 or 5, characterized in that the weighing means comprise a small bar (22) which is permanently connected at an extremity to the house or frame (4) of the device and to which bar a strain gauge (24) is fastened which emits a signal corresponding to the degree of bending of the bar which in turn is a measure for the weight present on the small receiving trough

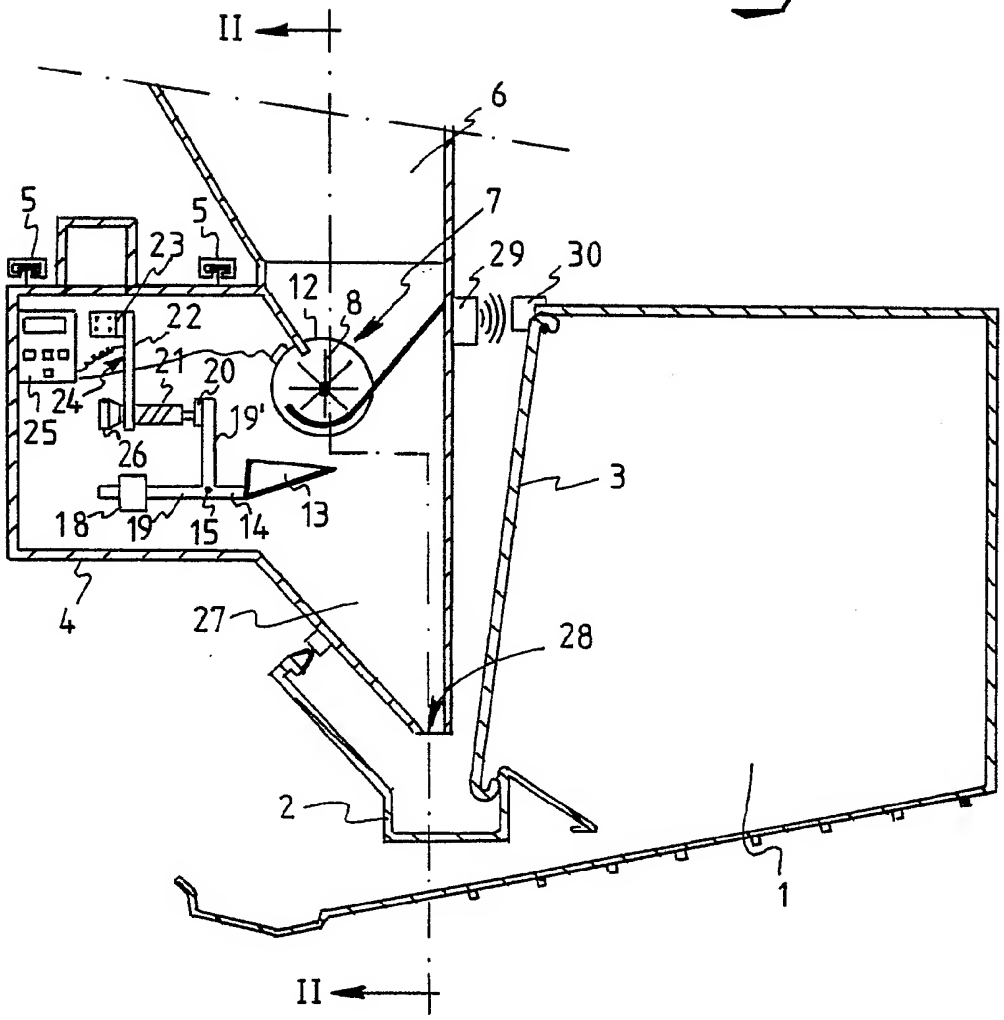
(13) and the small receiving trough (13) is fastened by clamping means to the free extremity of the small bar (22).

7. Device according to one of the claims 4, 5, or 6, characterized in that the small bar (22) with the strain gauge (24) near the free extremity is provided with the clamping means comprising an electromagnet (21) which is capable of interacting with a small metal plate (20) fastened on the arm (19') of the member having the small receiving trough (13).

8. Device according to one of the claims 4, 5, 6 or 7, characterized in that the device (4) is provided with a sensor (29) or the like which can scan an indicator (30) which can be fastened to a cage (1, 31, 32, 33, 34) and the indicator (30) emits an signal indicating the number of animals present in that cage.

9. Device according to one of the claims 4, 5, 6, 7 or 8, characterized in that the device is provided with a micro switch (35) or the like capable of interacting with a cam or the like (30), fastened to each cage, each cam indicating the moment at which the receiving trough (13) is to be emptied and for this purpose interrupts, for example the current to the electromagnet (21).

Fig:1



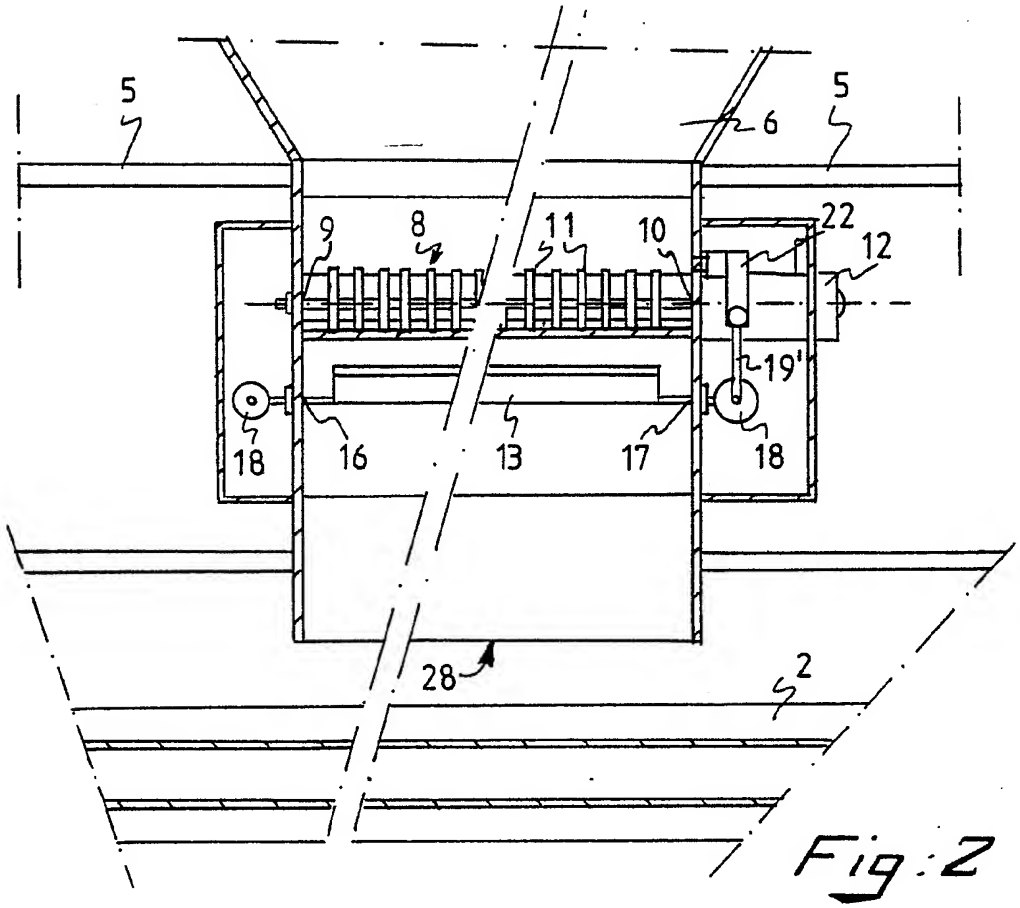


Fig:2

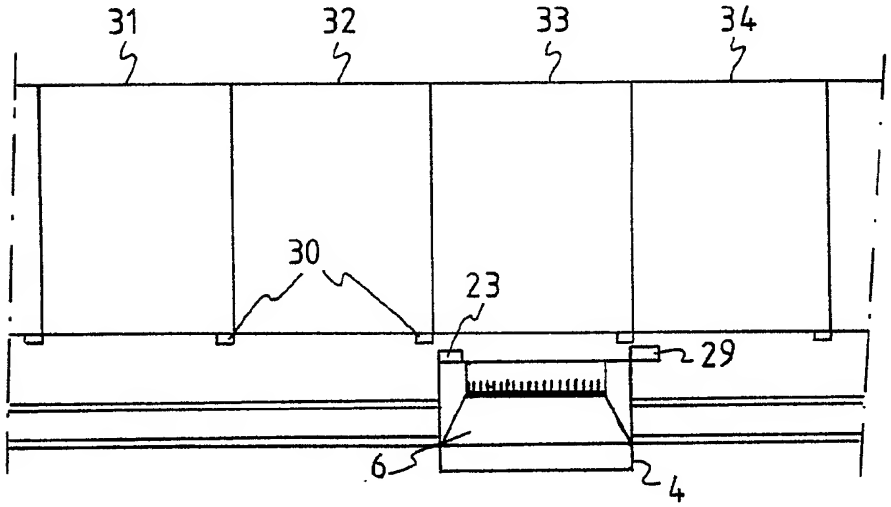


Fig:3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 87 20 2212

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
Y	GB-A-2 055 283 (BIG DUTCHMAN) * Page 1, lines 66-71; page 2, lines 35-40,92-93 *	1	A 01 K 5/02 A 01 K 39/012
Y	FR-A-2 507 435 (LA TELEMECANIQUE ELECTRIQUE) * Figure 1; claim 1 *	1,3	
Y	GB-A-1 562 486 (WALTERS) * Figures 1-4; page 3, line 119 - page 4, line 17; page 4, lines 104-106 *	3	
A		2,6	
A	DE-A-1 607 281 (MAYER) * Figure 2; claim 6 *	7	

TECHNICAL FIELDS SEARCHED (Int. Cl.4)
A 01 K

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	17-02-1988	VILBIG K

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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